

## **Conversion of Surfactant-Based Microemulsion to Surfactant-Free Microemulsion by CO<sub>2</sub>**

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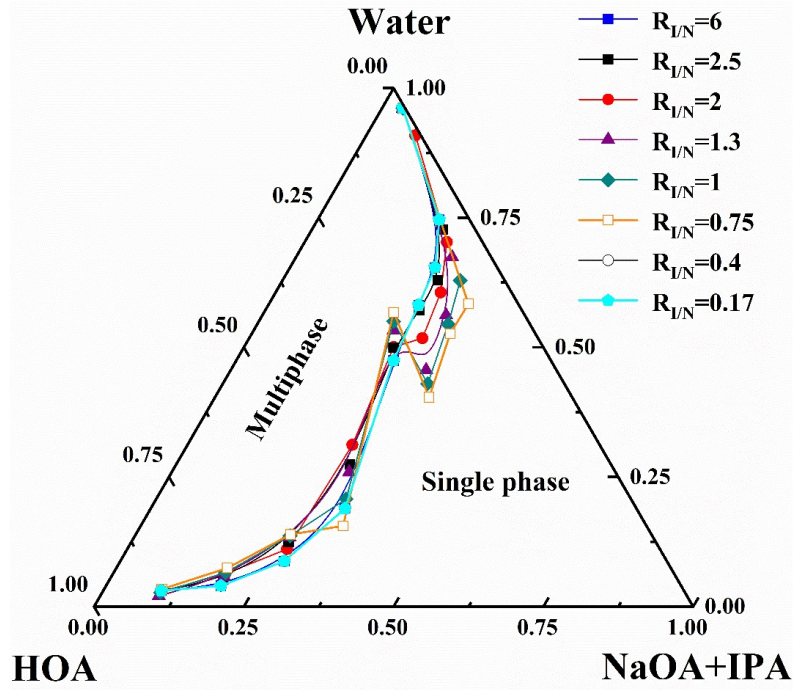
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1. The ternary phase diagram of the microemulsion corresponding to the different  $R_{I/N}$  values.

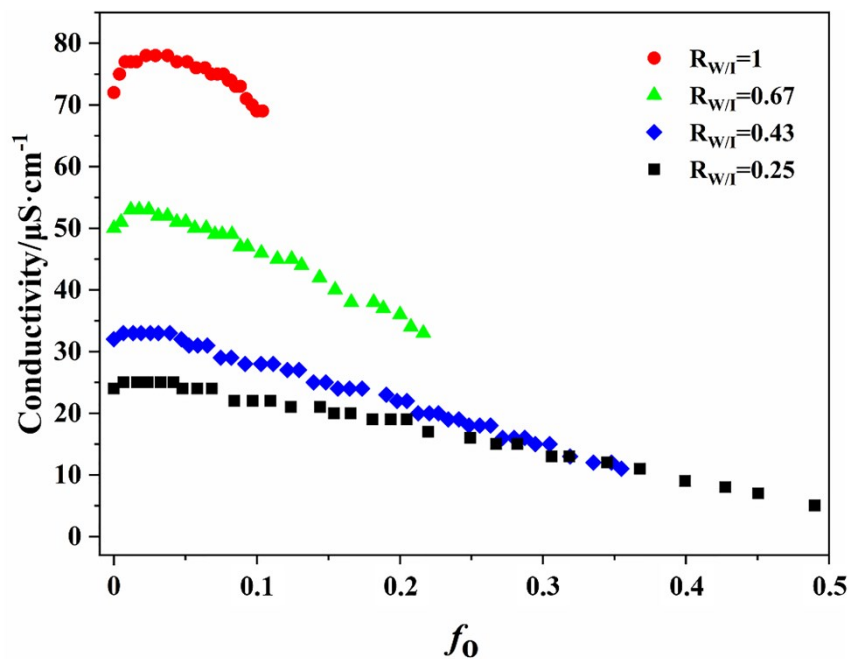


**Figure S1.** Effect of the ratio of different IPA and NaOA on the pseudo-ternary phase diagram of microemulsion.

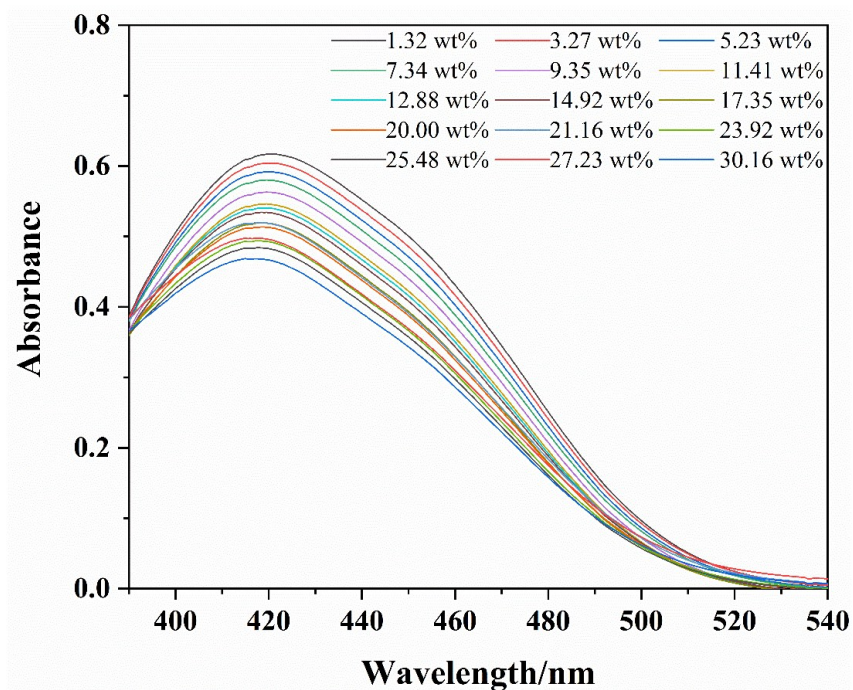
## 2. Molecular state distribution of species

Through the following formula, we can plot the molecular state distribution of a substance under different pH conditions. This material can have only one  $pK_a$  value or more.<sup>1, 2</sup>

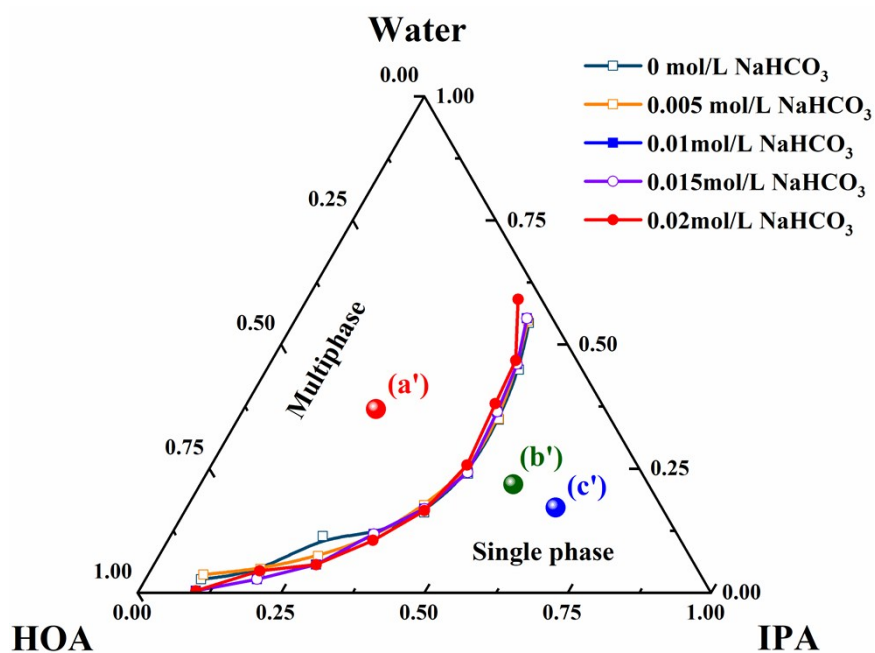
$$x_i = \frac{[H^+]^i \prod_{i=0}^{n-i} K_{ai}}{\sum_{i=0}^n [H^+]^i \prod_{i=0}^{n-i} K_{ai}} (K_{a0} = 1; i = 0, 1, \dots, n) \quad (S1-1)$$



**Figure S2.** Effect of oleic acid content ( $f_o$ ) on electrical conductivity of ternary system.



**Figure S3.** The UV-vis absorption curve of MO corresponds to different mass fractions of HOA (1.32 wt%-30.16 wt%).



**Figure S4.** The effect of different concentrations of  $\text{NaHCO}_3$  on the ternary phase diagram.

**Table S1.** The pH values of SFMEs without  $\text{NaHCO}_3$  addition.

IPA/g	$\text{H}_2\text{O/g}$	HOA/g	pH
2.5	4	4.3196	-
10	4	4.3196	3.96
15	4	4.3196	4.24

**Table S2.** The pH values of SFMEs with 0.02mol/L  $\text{NaHCO}_3$  addition.

IPA/g	0.02mol/L $\text{NaHCO}_3/\text{g}$	HOA/g	pH
2.5	4	4.3196	-
10	4	4.3196	5.17
15	4	4.3196	5.43

## References

1. D. Liu, Y. Suo, J. Tan and H. Lu, *Soft Matter*, 2017, **13**, 3783-3788.
2. C. C. Zhou, X. H. Cheng, O. D. Zhao, S. Liu, C. J. Liu, J. D. Wang and J. B. Huang, *Soft Matter*, 2014, **10**, 8023-8030.